Course Outline
ENVE 3004: Contaminant and Pollutant Transport in the Environment
Department of Civil and Environmental Engineering
Carleton University

Calendar Description

ENVE 3004 [0.5 credit] Contaminant and Pollutant Transport in the Environment
Physical phenomenon governing the transport of contaminants in the environment: diffusion, advection, dispersion, sorption, interphase transfer. Derivation and application of transport equation in air, surface and groundwater pollution; analytical and numerical solution. Equilibrium partitioning of contaminants among air, water, sediment and biota.

Prerequisite: CHEM 1000, CHEM 1101, ENVE 3002
Lectures three hours a week, problem analysis one hour a week.

Instructor
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Teaching Assistant
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Office hours: TBD in Class

Course Outline
Below is the tentative class schedule.

<table>
<thead>
<tr>
<th>Week</th>
<th>Topics</th>
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<tbody>
<tr>
<td>1-5</td>
<td>Fundamentals of contaminant transport and phase transformation</td>
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<tr>
<td>6-7</td>
<td>Contaminant transport in air</td>
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<tr>
<td>8-10</td>
<td>Contaminant transport in groundwater</td>
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<tr>
<td>11-12</td>
<td>Contaminant transport in surface water</td>
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Evaluation
10 % Assignments (4 to 5 in total)
20 % Midterm 1 (Tentatively scheduled for Feb 3)
20 % Midterm 2 (Tentatively scheduled for March 10)
50 % Final
- Midterms and exams are closed book and closed notes. In general, midterms are non-cumulative but fundamental components may appear on all exams. The final exam is cumulative.
- To pass the course students must (1) merit a passing grade in the course and (2) receive a minimum of 40% on the final

Textbook
*The textbook is on reserve and is available electronically at the library

Communications and Course Material
Electronic interaction with students will take place via Carleton’s learning management system cuLearn https://carleton.ca/culearn/. This site will present a topical organization of the course and will be used to disseminate most of the material related to the course: outline, lecture notes, e-mails etc. Students are responsible for following changes to the contents of this site throughout the course. Students are encouraged to ask questions in class and via email. Students should expect that questions sent via email will be given up to 1 business day before requiring a response.

Late Policy
All assignments are due at the beginning of the class when they are due. Penalties for late submission are 30% within the hour, 60% within 24 hours. Submissions received after 24 hours receive no credit. Students can discuss assignments with each other however assignments should be a reflection of your own work.
**Academic Accommodation**

You may need special arrangements to meet your academic obligations during the term. For an accommodation request the processes are as follows:

**Pregnancy obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: [http://www.carleton.ca/equity/](http://www.carleton.ca/equity/)

**Religious obligation:** write to me with any requests for academic accommodation during the first two weeks of class, or as soon as possible after the need for accommodation is known to exist. For more details visit the Equity Services website: [http://www.carleton.ca/equity/](http://www.carleton.ca/equity/)

**Academic Accommodations for Students with Disabilities:** The Paul Menton Centre for Students with Disabilities (PMC) provides services to students with Learning Disabilities (LD), psychiatric/mental health disabilities, Attention Deficit Hyperactivity Disorder (ADHD), Autism Spectrum Disorders (ASD), chronic medical conditions, and impairments in mobility, hearing, and vision. If you have a disability requiring academic accommodations in this course, please contact PMC at 613-520-6608 or pmc@carleton.ca for a formal evaluation. If you are already registered with the PMC, contact your PMC coordinator to send me your **Letter of Accommodation** at the beginning of the term, and no later than two weeks before the first in-class scheduled test or exam requiring accommodation (*if applicable*). After requesting accommodation from PMC, meet with me to ensure accommodation arrangements are made. Please consult the PMC website for the deadline to request accommodations for the formally-scheduled exam (*if applicable*) at [http://www.carleton.ca/pmc/new-and-currentstudents/dates-and-deadlines/](http://www.carleton.ca/pmc/new-and-currentstudents/dates-and-deadlines/)

You can visit the Equity Services website to view the policies and to obtain more detailed information on academic accommodation at: [http://www.carleton.ca/equity/](http://www.carleton.ca/equity/)
Contribution to CEAB Graduate Attributes

The Canadian Engineering Accreditation Board (CEAB) requires institutions offering engineering programs to demonstrate that the graduates of a program possess the attributes listed under thirteen categories. These attributes are interpreted in the context of candidates at the time of graduation but are clearly acquired throughout the program. This course aims to contribute to the following attributes as defined by CEAB:

1. **A knowledge base for engineering**: Demonstrated competence in university level mathematics, natural sciences, engineering fundamentals, and specialized engineering knowledge appropriate to the program.

2. **Problem analysis**: An ability to use appropriate knowledge and skills to identify, formulate, analyze, and solve complex engineering problems in order to reach substantiated conclusions.

3. **Investigation**: An ability to conduct investigations of complex problems by methods that include appropriate experiments, analysis and interpretation of data, and synthesis of information in order to reach valid conclusions.

4. **Design**: An ability to design solutions for complex, open-ended engineering problems and to design systems, components or processes that meet specified needs with appropriate attention to health and safety risks, applicable standards, and economic, environmental, cultural and societal considerations.

5. **Use of engineering tools**: An ability to create, select, apply, adapt, and extend appropriate techniques, resources, and modern engineering tools to a range of engineering activities, from simple to complex, with an understanding of the associated limitations.

6. **Individual and team work**: An ability to work effectively as a member and leader in teams, preferably in a multi-disciplinary setting.

7. **Communication skills**: An ability to communicate complex engineering concepts within the profession and with society at large. Such ability includes reading, writing, speaking and listening, and the ability to comprehend and write effective reports and design documentation, and to give and effectively respond to clear instructions.

8. **Professionalism**: An understanding of the roles and responsibilities of the professional engineer in society, especially the primary role of protection of the public and the public interest.

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